

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE (REV 10-95)		ATTORNEY'S DOCKET NUMBER 192379US2PCT <i>PCT</i>
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 09/581809
INTERNATIONAL APPLICATION NO. PCT/SE98/02356	INTERNATIONAL FILING DATE 17 DECEMBER 1998	PRIORITY DATE CLAIMED 19 DECEMBER 1997
TITLE OF INVENTION EXTERNAL ROUTING MANAGER		
APPLICANT(S) FOR DO/EO/US Anders BERGSTEN, et al.		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<ol style="list-style-type: none"> <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1). <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ol style="list-style-type: none"> <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). <input checked="" type="checkbox"/> has been transmitted by the International Bureau. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ol style="list-style-type: none"> <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). <input type="checkbox"/> have been transmitted by the International Bureau. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. <input checked="" type="checkbox"/> have not been made and will not be made. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)). 		
Items 13 to 18 below concern document(s) or information included:		
<ol style="list-style-type: none"> <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <p>A SECOND or SUBSEQUENT preliminary amendment.</p> <ol style="list-style-type: none"> <input type="checkbox"/> A substitute specification. <input type="checkbox"/> A change of power of attorney and/or address letter. <input type="checkbox"/> Certificate of Mailing by Express Mail <input checked="" type="checkbox"/> Other items or information: 		
<p>Request for Consideration of Documents Cited in International Search Report</p> <p>Notice of Priority PCT/IB/304 PCT/IB/308</p>		

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 09/581809	INTERNATIONAL APPLICATION NO. PCT/SE98/02356	ATTORNEY'S DOCKET NUMBER 19237US2PCT
20. The following fees are submitted:		CALCULATIONS PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <ul style="list-style-type: none"> <input type="checkbox"/> Search Report has been prepared by the EPO or JPO \$840.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) \$670.00 <input type="checkbox"/> No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$760.00 <input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$970.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$96.00 		

ENTER APPROPRIATE BASIC FEE AMOUNT =

Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)).	<input type="checkbox"/> 20	<input checked="" type="checkbox"/> 30	\$970.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	- 20 =	0	x \$18.00
Independent claims	- 3 =	0	x \$78.00

Multiple Dependent Claims (check if applicable).		<input type="checkbox"/>	\$0.00
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TOTAL OF ABOVE CALCULATIONS		=	\$1,100.00
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Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable).	<input type="checkbox"/>	\$0.00
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SUBTOTAL		=	\$1,100.00
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Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).	<input type="checkbox"/> 20	<input type="checkbox"/> 30	+ <input type="checkbox"/>	\$0.00
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TOTAL NATIONAL FEE		=	\$1,100.00
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Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).	<input type="checkbox"/>	\$0.00
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TOTAL FEES ENCLOSED		=	\$1,100.00
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Amount to be: refunded	\$
charged	\$

A check in the amount of **\$1,100.00** to cover the above fees is enclosed.

Please charge my Deposit Account No. **15-0030** in the amount of to cover the above fees.
A duplicate copy of this sheet is enclosed.

The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **15-0030** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.



& NEUSTADT, P.C.

22850

703-413-3000

WILLIAM E. BEAUMONT
REGISTRATION NUMBER 30,996

Marvin J. Spivak

NAME

24,913

REGISTRATION NUMBER

DATE

09/581809

192379US2 PCT

534 Rec'd PCT/PTC 19 JUN 2000

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF : :

ANDERS BERGSTEN ET AL : ATTN: APPLICATION DIVISION

SERIAL NO: NEW APPLICATION :
(BASED ON PCT/SE98/02356)

FILED: HEREWITH : :

FOR: EXTERNAL ROUTING MANAGER

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Prior to a first examination on the merits, please amend the above-identified application as follows:

IN THE SPECIFICATION

Page 1, between lines 1 and 2, insert

--BACKGROUND OF THE INVENTION--;

prenumbered line 9, delete in its entirety and insert therefor
--Discussion of the Background--.

IN THE CLAIMS

Please amend the claims as follows:

Claim 5, line 1, delete "or 4".

Claim 8, line 1, change "any of the patent claims 1 7" to --claim 1--.

Claim 14, line 1, change "any of the patent claims 9-13" to --claim 9--.

IN THE ABSTRACT

Prenumbered line 3, delete in its entirety and insert therefor --A routing manager that makes possible the--;

prenumbered line 5, change "invention" to --routing manager--;

prenumbered line 8, after "The" insert --routing manager--;

prenumbered line 9, delete "invention".

REMARKS

Favorable consideration of this application, as presently amended, is respectfully requested.

The present preliminary amendment is submitted to place the above-identified application in more proper format under United States practice. By the present preliminary amendment the specification has been amended to include further suggested headings. The claims have been amended to no longer recite any multiple dependencies. The Abstract has also been amended to correct minor informalities.

The present application is believed to be in condition for a full and thorough examination on the merits. An early and favorable consideration of the present application is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
Surinder Sachar
Registration No. 34,423



22850

(703) 413-3000
Fax #: (703)413-2220
SNS/js

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WILLIAM E. BEAUMONT
REGISTRATION NUMBER 30,996

TITLE OF THE INVENTION: EXTERNAL ROUTING MANAGER

Field of the invention

5 The present invention relates to a method and a device for routing of information packets by means of routing protocol in just any network, preferably the Internet.

Prior art

10 The Internet today utilizes in the main different distributed routing protocols to manage the routing of Internet Protocol (IP)-packets. These distributed protocols contribute to making Internet a robust and scaleable network.

15 These protocols, however, also have some disadvantages. It will take comparatively long time to introduce new routing mechanisms, and the algorithms which are used to calculate routes are not allowed to be too 20 demanding as far as calculation is concerned. In addition it is difficult to take into consideration demands from individual flows as far as the quality of the route is concerned, and/or calculate routes based on network information in combination with service information. The 25 aim of the present invention consequently is to remove these disadvantages.

Summary of the invention

30 The above mentioned aim is achieved by a method and a device for routing of information packets by means of distributed routing protocols in just any network, at which an External Routing Manager (ERM) is utilized to attain a plurality of not distributed routing algorithms in said just any network as a complement to routing algorithms 35 which are utilized by said distributed routing protocol.

This invention has the potential of becoming a key component in Telia's future IP (Internet Protocol)-network. With an ERM it will be possible to use a plurality of route calculation algorithms in the same network, each one adapted to both optimal network utilization and the demands on the carrier service by different applications. It also will be possible to create quite new carrier services, for instance increased support of mobility. All this functionality moreover can be adapted, and also be exchanged, any time at the same time as the network all the time is in operation.

Telia will be able to offer highly worked up IP-based carrier services if the ERM-concept is introduced in Telia's IP-network. These services will both be possible to be tailor-made to specific customers or groups of customers, and be introduced and adapted very quickly at changed conditions and needs.

Further characteristics of the present invention are given in the subclaims.

20

Brief description of the drawing

In the following a detailed description of an embodiment of the invention is given with reference to Figure 1.

25

Figure 1 shows the architecture of an ERM according to the invention.

Detailed description of an embodiment of the invention

In the following the overall functionality of the invention first will be described. After that, the function and the architecture of the ERM will be described. The different abbreviations which are mentioned throughout in the text are explained below:

35

ERM

External Route Manager

	ERM _{ap}	External Route Manager agent part
	ERM _{rp}	External Route Manager router part
5	BRA	Basic Routing Algorithm
	RPA	Reference Point nr #
10	ERA	Explicit Routing Algorithm

15 The invention intends to make possible the utilization of routing algorithms as a complement to the distributed routing protocols of today. The invention also allows these completing algorithms to be considerably more demanding 20 regarding calculations, and facilitates the use of service information at route calculations.

25 The invention includes a definition of which functionality that is required to make possible simultaneous use of more than one route calculation algorithm, without risking long-lasting, or even permanent, routing loops.

30 The invention makes possible use of not distributed routing algorithms as a complement to the algorithms which are used by distributed routing protocols. This means that explicit routes are set up through the network which replace the route which is determined by a distributed protocol. To allow this, a check should be made whether the new route is free from loops.

35 This new route is maintained until it is no longer needed, or until it is no longer valid due to that some kind of error has occurred. Such errors can be link errors, errors on any of the computers which are involved in maintaining the new route and/or routers which are included in this route.

40 When the new route no longer shall be used, concerned traffic returns to following the route which the

distributed routing protocol has selected. At this return it is important to secure that no routing loops will arise. If routing loops yet should arise, these should be possible to detect and break.

5 The basic functionality which is required to make possible simultaneous use of more than one route calculation algorithm can be collected in two functional groups, free and independent of which algorithms that are used to calculate explicit routes. We call these functional
10 groups External Route Manager agent part, and router part (ERMap and ERMrp). When we refer to ERM, these two functional groups are referred to together.

15 The physical location of the ERM-functionality differs between ERMap and ERMrp. Figure 1 shows the possible physical location of the functional groups and which reference points that exist between them. The exact definition of the functions and the specifications of
20 respective reference point, however, is not dealt with here as this invention relates to the conceptual design of the architecture.

25 ERMap should be localized in the same machine that has functions (ERA in Figure 1) to calculate explicit routes. This machine can be a router or a separate computer connected to the network where the explicit routes shall be used. The following functions are included in ERMap:

- check of that suggested explicit routes are free from loops.
- 30 • check whether potential loops may arise and, if so, identification of where such loops can arise, and
- attend to that potential loops do not occur.

35 ERMap interacts with ERMrp (RP2 in Figure 1) to establish and maintain explicit routes and prevent

emergence of loops by specifying methods at errors which can cause loops. ERMrp shall be localized in all routers which are involved in the explicit routes which are established via ERM. The following functions are included
5 in ERMrp:

- detection of error after established explicit routes, and
- 10 • measure to prevent or break loops.

ERMrp interacts with traffic-control functionality in the router (RP3) to establish and maintain explicit routes. ERMrp also shall have information from the traffic control
15 (RP3), or from the distributed route calculation function (RP4) about errors, if any. At such errors ERMrp shall take measures to prevent loops, and inform ERMap about executed measures.

ERMrp also receives information from the distributed
20 route calculation function (RP4) about current network topology and, possibly, network status. ERMrp forwards this information to ERMap which utilizes it to execute the above mentioned functions. This information is distributed in the network by a distributed routing protocol of "link state"-
25 type, for instance OSPF, IS-IS etc.

ERA can when a new route is suggested (RP1) also suggest alternative routes. These can be used by ERMap to prepare a more rapid change to such an alternative route in case of error along the route which is used. This can be
30 prepared by state being established in concerned ERMrp or

by ERMap quite simply being prepared to distribute the alternative route to concerned ERMrp.

RP4 in Figure 1 is today usually used in a router to establish routes calculated by some distributed algorithm.

5 To sum up, it can be said that the invention differs from previously known technology chiefly by the managing of loops being separated from the route calculation algorithms. This results in that new algorithms can be developed quicker. The invention also makes it possible to
10 return to the original route calculation algorithm if an error occurs. The concept and the mechanism for the managing of loops, and the return to the original algorithm, constitutes, as far as we know, new technology which is not previously known.

15 The above mentioned is only to be regarded as an advantageous embodiment, and the extent of protection of the invention is only defined in what is indicated in the enclosed patent claims.

PATENT CLAIMS

1. Method for routing of information packets by means of distributed routing protocols in just any network, characterized in that an External Route Manager (ERM) is utilized to effect a plurality of not distributed routing algorithms in said just any network as a complement to routing algorithms which are utilized by said distributed routing protocol.

10 2. Method according to patent claim 1, characterized in that said ERM establishes at least one explicit route in said just any network which replaces the route which is determined by said distributed routing protocol.

15 3. Method according to patent claim 2, characterized in that said explicit route is upheld until it is no longer needed, or until it is no longer valid due to that an error has occurred.

4. Method according to patent claim 3,

20 characterized in that said error is link error, error in computers, routers which uphold said explicit route.

5. Method according to patent claim 3 or 4, characterized in that when said explicit route

25 no longer shall be used, concerned traffic reverts to following the route which said distributed routing protocol has selected.

6. Method according to patent claim 5, characterized in that when traffic reverts to

30 following the route which said distributed routing protocol

has selected, is secured that no routing loops arises, at which, if routing loops yet arise, they are detected and broken.

7. Method according to patent claim 6,
5 characterized in that said ERM operates according to the steps to:

- check that suggested explicit route is free from loops;
- check whether potential loops may arise and identify where such loops may arise;
- prevent the emergence of potential loops;
- detect errors along established, explicit route;
- break arisen loop.

15 8. Method according to any of the patent claims 1-7, characterized in that said just any network is an IP-network.

9. Device for routing of information packets by means of distributed routing protocols in just any network,
20 characterized in that an External Route Manager (ERM) is arranged to effect a plurality of not distributed routing algorithms in said just any network as a complement to routing algorithms which are utilized by said distributed routing protocol.

25 10. Device according to patent claim 9,
characterized in that said ERM includes an ERMap and an ERMrp, at which said ERMap interacts with said ERMrp to establish and uphold explicit routes and prevent the emergence of loops by specifying measures at errors
30 which can cause loops.

11. Device according to patent claim 10,
characterized in that said ERMap is arranged in
the machine which has functions to calculate explicit
routes, and said ERMap is arranged in all routers which are
involved in the explicit routes which are established via
said ERM.

12. Device according to patent claim 11,
characterized in that said ERMap is arranged to
check that suggested explicit routes are free from loops,
to check whether potential loops may arise, and identify
where such loops may arise, to prevent the emergence of
potential loops.

13. Device according to patent claim 12,
characterized in that said ERMap is arranged to
detect errors along established explicit routes and prevent
or break loops.

14. Device according to any of the patent claims 9-13,
characterized in that said just any network is
an IP-network.

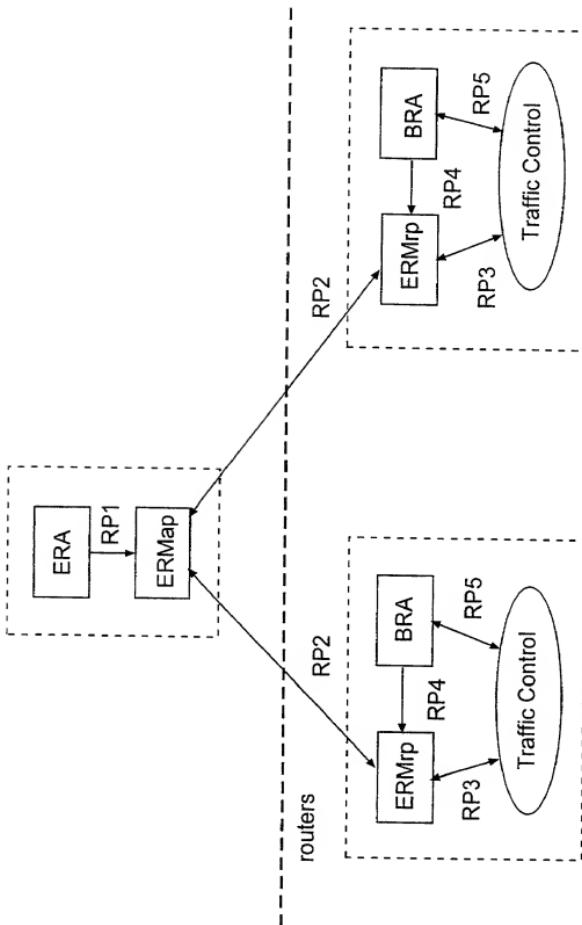


Figure 1

Declaration, Power Of Attorney and Petition

Page 1 of 4

WE (I) the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

EXTERNAL ROUTING MANAGER

the specification of which

is attached hereto.

was filed on June 19, 2000 as
Application Serial No. _____
and amended on _____.

was filed as PCT international application
Number PCT/SE98/02356
on 17 December 1998,
and was amended under PCT Article 19
on _____ (if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application(s)

Application No.	Country	Day/Month/Year	Priority Claimed
9704772-4	SWEDEN	19 December 1997	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No

We (I) hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

(Application Number)	(Filing Date)
(Application Number)	(Filing Date)

We (I) hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application Serial No.	Filing Date	Status (pending, patented, abandoned)
PCT/SE98/02356	17 December 1998	

And we (I) hereby appoint: Norman F. Oblon, Reg. No. 24,618; Marvin J. Spivak, Reg. No. 24,913; C. Irvin McClelland, Reg. No. 21,124; Gregory J. Maier, Reg. No. 25,599; Arthur I. Neustadt, Reg. No. 24,854; Richard D. Kelly, Reg. No. 27,757; James D. Hamilton, Reg. No. 28,421; Eckhard H. Kuesters, Reg. No. 28,870; Robert T. Pous, Reg. No. 29,099; Charles L. Gholz, Reg. No. 26,395; William E. Beaumont, Reg. No. 30,996; Jean-Paul Lavallee, Reg. No. 31,451; Stephen G. Baxter, Reg. No. 32,884; Richard L. Treanor, Reg. No. 36,379; Steven P. Weilrouth, Reg. No. 32,829; John T. Goolkasian, Reg. No. 26,142; Richard L. Chinn, Reg. No. 34,305; Steven E. Lipman, Reg. No. 30,011; Carl E. Schlier, Reg. No. 34,426; James J. Kulbaski, Reg. No. 34,648; Richard A. Neifeld, Reg. No. 35,299; J. Derek Mason, Reg. No. 35,270; Surinder Sachar, Reg. No. 34,423; Christina M. Gadiano, Reg. No. 37,628; Jeffrey B. McIntyre, Reg. No. 36,862; William T. Enos, Reg. No. 33,128; Michael E. McCabe, Jr., Reg. No. 37,182; Bradley D. Lytle, Reg. No. 40,073; and Michael R. Casey, Reg. No. 40,294; our (my) attorneys, with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith; and we (I) hereby request that all correspondence regarding this application be sent to the firm of OBLON, SPIVAK, McCLELLAND, MAIER & NEUSTADT, P.C., whose Post Office Address is: Fourth Floor, 1755 Jefferson Davis Highway, Arlington, Virginia 22202.

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Anders BERGSTEN
NAME OF FIRST ~~SOLE~~ INVENTOR

Anders Bergsten
Signature of Inventor

2000-07-31
Date

Residence: Assistentvagen 254,
S-977 52 Lulea SWEDEN SEX

Citizen of: SWEDEN

Post Office Address: same as above

200

ULF BODIN
NAME OF SECOND JOINT INVENTOR

Cef Bodi

Signature of Inventor

2000-08-01

Date

Residence: Klintvagen 301 A,
S-973 32 Lulea SWEDEN SEX

Citizen of: SWEDEN

Post Office Address: same as above

300

Anders ERIKSSON
NAME OF THIRD JOINT INVENTOR

Anders Eriksson

Signature of Inventor

2000-08-25

Date

Residence: Klintvagen 123 B,
S-973 32 Lulea SWEDEN SEX

Citizen of: SWEDEN

Post Office Address: same as above

400

Nils-Ake KLITBY
NAME OF FOURTH JOINT INVENTOR

Nils-Ake Klitby

Signature of Inventor

2000-08-14

Date

Residence: Blidvagen 56,
S-976 32 Lulea SWEDEN SEX

Citizen of: SWEDEN

Post Office Address: same as above

500

Anders LARSSON
NAME OF FIFTH JOINT INVENTOR

Anders Larsson

Signature of Inventor

2000-08-07

Date

Residence: Forskarvagen 134,
S-977 53 Lulea SWEDEN SEX

Citizen of: SWEDEN

Post Office Address: same as above

600 Bjorn NORDGREN
NAME OF SIXTH JOINT INVENTOR

Signature of Inventor

2000-08-04

Date

700 Emil SVANBERG
NAME OF SEVENTH JOINT INVENTOR

Signature of Inventor

2000-08-01

Date

NAME OF EIGHTH JOINT INVENTOR

Signature of Inventor

Date

NAME OF NINTH JOINT INVENTOR

Signature of Inventor

Date

Residence: Lingonstigen 3,
S-973 33 Lulea SWEDEN ~~SEA~~

Citizen of: SWEDEN

Post Office Address: same as above

Residence: Docentvagen 20,
S-977 52 Lulea SWEDEN ~~SEA~~

Citizen of: SWEDEN

Post Office Address: same as above

Residence: _____

Citizen of: _____

Post Office Address: _____

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